REMARKS

Claims 1-4 and 20-31 are all the claims presently pending in the application. Claim 1 has been amended to more particularly define the invention. Claims 20-31 have been added to assure Applicant the degree of protection to which his invention entitles him. Claims 5-19 were previously withdrawn pursuant to the election requirement and now canceled without prejudice or disclaimer.

It is noted that the claim amendments are made only to assure grammatical and idiomatic English and improved form under United States practice, and are not made to distinguish the invention over the prior art or narrow the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Jaskie et al., (U.S. Patent No. 5,698,941) in view of Kimura et al., (U.S. Patent No. 6,195,196) and Suehiro et al., (JP 2001-217466). These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

In an exemplary aspect, as recited in claim 1, the invention is directed to a light emitting apparatus, including a light emitting element including a nitride semiconductor, a phosphor that absorbs light emitted from the light emitting element and emits light with a wavelength different from that of the absorbed light, a first reflection mirror that reflects the

light emitted from the light emitting element to converge the light, a second reflection mirror that has a light passing hole at a position on which the light reflected on the first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror, and a phosphor layer that includes the phosphor, the phosphor layer being placed over said light passing hole and at a specific region in transparent resin that part of light passing through the light passing hole is radiated.

Another aspect of the invention, as recited in claim 20, is directed to a light emitting apparatus, including a first reflector having a concave shape for converging light emitted from a light emitting element mounted on a first surface of a plate facing the first reflector onto a predetermined position on the first surface of the plate, a second reflector provided on a second surface of said plate opposite the first surface, a light passing hole in the plate located at the predetermined position for permitting the converged light to pass through the plate, and a phosphor layer displaced from a second surface of the plate opposite the first surface and aligned over the light passing hole comprising a phosphor that absorbs light emitted from the light emitting element and emits light having a wavelength different from that of the absorbed light, wherein the converged light passing through the light passing hole is incident upon the phosphor layer and at least a portion of the converged light is absorbed by the phosphor.

Conventional techniques for obtaining a light color, which is originally impossible to produce using only a semiconductor light-emitting device (LED), involve wavelength conversion. This technique involves placing at least one phosphor over or around an LED whereby the phosphor absorbs light emitted from the LED and emits light having a different wavelength (e.g. different color) than that of the absorbed light. (Application at page 1, lines

27-29 and page 2, lines 1-6) Generally, the phosphor is mixed with an epoxy resin or silicone resin that is used to seal the LED such that the phosphor is positioned around the LED. (Application at Page 2, lines 21-23)

However, in light emitting apparatuses utilizing such conventional techniques employing wavelength conversion, problems exist in that the excitation light emitted from the phosphor and/or the light emitted from the LED is so dispersed that the light cannot be sufficiently outputted in the direction of an emission observation surface. Especially, the light returning to the LED is not sufficiently reflected in the direction of the emission observation surface. As a result, the emission efficiency of such devices is lowered. (Application at page 2, lines 24-29 and page 3, lines 1-3)

The claimed invention, on the other hand, provides a light emitting apparatus in which light dispersed in the direction opposite the emission observation surface is reflected by the reflection mirrors in the direction of the emission observation surface. Additionally, the light emitted from the LED is converged and the phosphor is placed in the convergence region. Therefore, the amount of phosphor used can be reduced. Furthermore, part of the light reflected on the reflection mirrors is extracted in the direction of the emission observations surface while passing through the phosphor. These features enhance the emission efficiency of the light emitting apparatus. (Application at page 26, lines 10-21)

Moreover, any light reflected or dispersed on the lower surface of the phosphor layer is reflected by the second reflector mirror and part of the reflected light is radiated back to the phosphor layer. However, since the area of the phosphor layer can be minimized by converging the light incident upon it, any re-radiation or dispersion of the reflected light is

slight. As such, most of the light reflected on the second reflector is outputted directly to the emission observation surface, thus further enhancing the emission efficiency of the light emitting apparatus. (Application at page 19, lines 1-16)

II. THE 35 USC §112, SECOND PARAGRAPH REJECTION

Claim1-4 stand rejected under 35 U.S.C. §112, second paragraph. The claims have been amended, above, to overcome this rejection. Specifically, claim 1 was amended to more particularly indicate that the light emitting element comprises a nitride semiconductor.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III. THE PRIOR ART REJECTION

The Examiner alleges that Jaskie et al. would have been combined with Kimura et al. and Suehiro et al. to form the claimed invention. However, Applicant submits that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention.

Applicant respectfully submits that these references would not have been combined as alleged by the Examiner. Indeed, these references are completely unrelated, and no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, Applicant submits that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, contrary to the

Examiner's allegations, none of these references teach or suggest their combination.

Therefore, Applicant respectfully submits that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Moreover, neither Jaskie et al., nor Kimura et al., nor Suehiro et al., nor any combination thereof, teaches or suggests "*a second reflection mirror that has a light passing hole at a position on which the light reflected on said first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror,*" as recited in claims 1 (emphasis added) and similarly in claim 20.

As noted above, unlike conventional methods, the claimed invention provides a light emitting apparatus in which light dispersed in the direction opposite the emission observation surface is reflected by the reflection mirrors in the direction of the emission observation surface. In particular, any light reflected or dispersed away from the emission observation surface by the phosphor layer is reflected by the second reflector mirror. While part of the reflected light is radiated back to the phosphor layer, since the area of the phosphor layer can be minimized by converging the light incident upon it, any re-radiation or dispersion of the reflected light by the phosphor is slight. As such, most of the light reflected by the second reflector is outputted directly to the emission observation surface, thus further enhancing the emission efficiency of the light emitting apparatus. Therefore, the features of the claimed invention provide a light emitting apparatus with enhanced emission efficiency.

Clearly, these features are not taught or suggested by the cited references.

A. The Jaskie et al. Reference

Jaskie et al. discloses an optical correction layer for a light emitting apparatus having gaps in brightness at the light-emitting surface. The optical correction layer includes a plurality of optical correction regions centered over the gaps, and a plurality of optically transparent regions which overlay the remainder of the light-emitting surface. The optical correction regions include appropriately formed grooves which collect and redirect light adjacent to the gaps to cover and conceal the gaps. (Jaskie et al. at Abstract)

The Examiner concedes on page 3 of the Office Action that Jaskie et al. does not disclose a light emitting element comprising a nitride semiconductor or a phosphor layer being placed in a transparent resin, as required in claim 1. Rather, the Examiner attempts to rely on Kimura et al. and Suehiro et al. to make up the deficiencies of Jaskie et al.

However, Applicant respectfully submits that Jaskie et al. further fails to disclose, amongst other features, a second reflection mirror that has a light passing hole at a position on which the light reflected on said first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror, as in Applicant's claimed invention.

In fact, nowhere does Jaskie et al. teach or suggest a second reflection mirror that has a reflection surface on the side opposite to the side facing said first reflection mirror so that any light reflected or dispersed away from the emission observation surface by the phosphor layer is reflected by the reflection surface back toward the emission observation surface, thus improving the emission efficiency of the apparatus. Rather, Jaskie et al. merely discloses a two reflective surfaces 824,830 in which light is reflected from reflective surface 824 toward

surface 830. (Jaskie et al. at Figure 16 and column 8, lines 18-20) As such, in contrast to the present invention, the reflective surfaces in Jaskie et al. face or oppose each other.

Additionally, Applicant respectfully submits that Jaskie et al. teaches away from the claimed invention. Specifically, Jaskie et al. discloses forming reflective surfaces 824,830 in an optical correction layer which redirect light emitted from the phosphor dots 808, 810. In fact, the reflective surface does not converge the light, as in the present invention, rather "the curvature of the reflective surface(s) 830 is predetermined to **spread** light 816 over the portion of the outer surface 817" opposite the gap 806. (Jaskie et al. at column 8, lines 27-30) (emphasis added) As can be seen in Figure 16, light 816 is redirected by surface 824 onto surface 830 whereby the light is spread over the outer surface 817 to cover the gap 806. Clearly, the reflective surfaces in Jaskie et al. do not converge the light, as in the claimed invention.

Further, the Examiner asserts that the hole formed between the two surfaces 824 suggests the light passing hole of the present invention. Assuming arguendo that the assertion is accurate, the light 816 depicted in Jaskie et al. passes through the hole to the outer surface and is not incident upon the phosphor dots 808,810. The Examiner further asserts that the direction as depicted in the figures can be reversed. However, Jaskie et al. explicitly teaches away from doing so by the fact that the light 816 travels in the direction shown in order to provide a display without gaps. To reverse the direction in which the light flows in Jaskie et al. would result in a non-functioning display. Even if such were possible, the result would be the creation of gaps, which is a the problem Jaskie et al. attempts to address.

Clearly, Jaskie et al. fails to teach or suggest the claimed invention.

B. The Kimura et al. Reference

Kimura et al. discloses an array-type exposing device, for exposing an image forming body incorporated in an image forming apparatus, including a flat light source for emitting UV rays and a light modulator unit disposed above the flat light source so as to be associated with at least one unit area derived by dividing each pixel on the image, the light modulator unit modulating the UV ray by electromechanical operation to expose the image forming body. (Kimura et al. at Abstract)

The Examiner attempts to rely on Kimura et al. to make up for the deficiencies of Jaskie et al. Namely, the Examiner asserts that Kimura et al. discloses the use of a nitride semiconductor, as recited in claim 1.

However, Applicant respectfully submits that Jaskie et al. fails to teach or suggest each and every element of the claimed invention as recited in claim 1. Specifically, there is no teaching or suggestion in Jaskie et al. of a second reflection mirror that has a light passing hole at a position on which the light reflected on said first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror. This feature allows any light reflected or dispersed away from the emission observation surface by the phosphor layer to be reflected by the reflection surface back toward the emission observation surface, thus improving the emission efficiency of the apparatus

Moreover, neither Jaskie et al, nor Kimura et al., nor any combination thereof, teaches or suggests "*a second reflection mirror that has a light passing hole at a position on which the light reflected on said first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror*," as recited in

claims 1 and 20.

Furthermore, while Kimura et al. may teach the use of a nitride semiconductor in an array-type exposing device, nowhere does the reference teach or suggest including a second reflection mirror that has a reflection surface on the side opposite to the side facing said first reflection mirror to improve the emission efficiency of the apparatus. Indeed, nowhere does Kimura et al. disclose a reflecting mirror of any type or a phosphor layer for wavelength conversion. Kimura et al. fails to even recognize the problem of excessive dispersion of excitation light emitted from a phosphor and/or the light emitted from an LED such that the light cannot be sufficiently outputted in the direction of an emission observation surface, which is a problem that the claimed invention is intended to address. Therefore, Kimura et al. clearly does not make up for the deficiencies of Jaskie et al.

In light of the above, Applicant submits that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

C. The Suehiro et al. Reference

Suehiro et al. discloses a reflection-type light-emitting device that includes light-emitting device, a lead having a mount part for mounting the light-emitting device, and a reflector, wherein the mount part includes a recessed part that is open while opposing the center of the reflection mirror on the center axis of the reflector and accommodates the light-emitting device and a phosphor in the recessed part. (Suehiro et al. at Abstract)

The Examiner attempts to rely on Suehiro et al. to make up for the deficiencies of Jaskie et al. Namely, the Examiner asserts that Suehiro et al. discloses a phosphor, as recited in claim 1.

However, Applicant respectfully submits that Jaskie et al. fails to teach or suggest each and every element of the claimed invention as recited in claim 1. Specifically, there is no teaching or suggestion in Jaskie et al. of a second reflection mirror that has a light passing hole at a position on which the light reflected on said first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror. This feature allows any light reflected or dispersed away from the emission observation surface by the phosphor layer to be reflected by the reflection surface back toward the emission observation surface, thus improving the emission efficiency of the apparatus

Moreover, neither Jaskie et al, nor Suehiro et al., nor any combination thereof, teaches or suggests "*a second reflection mirror that has a light passing hole at a position on which the light reflected on said first reflection mirror is converged and that has a reflection surface on the side opposite to the side facing said first reflection mirror*," as recited in claims 1 and 20.

Further, Applicant respectfully submits that Suehiro et al. specifically fails to teach or suggest a phosphor layer, as asserted by the Examiner. Rather, Suehiro et al. discloses that a LED is placed on a center axis of a reflection mirror and covered with a phosphor-dispersed epoxy resin, thus, in operation, light from the LED is absorbed by the phosphor and light of a different wavelength (e.g. color) is radiated in all directions. (Application at page 2, lines 7-14) However, there is no teaching or suggestion in Suehiro et al. of a phosphor layer being

placed over a light passing hole and at a specific region in the transparent resin such that part of light passing through the light passing hole is absorbed, as recited in claim 1.

Even assuming arguendo that Suehiro et al. may teach a phosphor layer being placed in a transparent resin, as asserted by the Examiner, nowhere does Suehiro et al. teach or suggest including a second reflection mirror that has a reflection surface on the side opposite to the side facing said first reflection mirror to improve the emission efficiency of the apparatus. Indeed, the cited reference does not even recognize the desirability or benefit of providing such a feature. Therefore, Suehiro et al. clearly does not make up for the deficiencies of Jaskie et al.

In light of the above, Applicant submits that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

IV. CONCLUSION

In view of the foregoing, Applicant submits that claims 1-4 and 20-31, all the claims presently pending in the application, are patentably distinct over the prior art of record and are allowable, and that the application is in condition for allowance. Such action would be appreciated.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned attorney at the local telephone number

listed below to discuss any other changes deemed necessary for allowance in a telephonic or personal interview.

To the extent necessary, Applicant petitions for an extension of time under 37 CFR §1.136. The Commissioner is authorized to charge any deficiency in fees, including extension of time fees, or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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